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BOSTON SOCIETY OF CIVIL ENGINEERSFOUNDED 1848

PROCEEDINGS

PAPERS IN THIS NUMBER.

"The Equipment of the Commonwealth Dry Dock, Boston, Mass." Frank W. Hodgdon.

Memoirs of deceased members.

MINUTES OF MEETINGS.

BOSTON, September 17, 1919. — A regular meeting of the Boston Society of Civil Engineers was held this evening at Chipman Hall, Tremont Temple, and was called to order at 7.50 o'clock by the Senior Vice-President, Leonard C. Wason.

There were present fifty-five members and visitors.

The record of the May meeting was approved as printed in the June JOURNAL and that of the June meeting was read by the Secretary and approved by vote of the meeting.

The Secretary reported for the Board of Government that it had elected to membership in the grades named the following candidates:

Members — Walter Scott Fox, Edward Allen Varney.

Associate — Ransom J. Rowe.

The Secretary presented reports for the committees appointed to prepare memoirs of deceased members as follows: Memoir of John Allen Gould, prepared by Messrs. Desmond FitzGerald and William A. Wood; memoir of Gilbert Hodges, prepared by Messrs. Ephraim Harrington and Arthur W. Hodges.

By vote the memoirs were accepted and ordered printed in the JOURNAL of the Society.

The subject for discussion at the meeting was "The New Boston Dry Dock."

Mr. James W. Rollins with the aid of lantern slides described very fully the construction work of the dock, and Mr. Frank W. Hodgdon followed with a description, also illustrated with lantern slides, of the pumping, caisson and capstan machinery as installed at the dock.

After a short discussion, the meeting adjourned.

S. E. TINKHAM, *Secretary*.

BOSTON, June 4, 1919. — The Sanitary Section of the Boston Society of Civil Engineers held a special meeting this evening in the Society Library, Tremont Temple. The meeting was called to order by the chairman, Edgar S. Dorr, at 7.45 P.M.

The Clerk read the names of the new members enrolled in the Sanitary Section by the Executive Committee:

The chairman introduced Mr. H. W. Rowley, M.E., of Boston, who spoke on "The Final Disposal of Boston City Wastes." Mr. Rowley explained the method of collection and separation of the garbage and other wastes of the city of Boston; the garbage reduction plant was described in detail. The talk was finely illustrated by lantern slides.

On motion of Mr. Fales, a rising vote of thanks was given to the speaker for his interesting address.

The meeting adjourned at 9.50 P.M. Attendance, sixteen.

JOHN P. WENTWORTH, *Clerk*.

BOSTON, June 5, 1919. — The Sanitary Section of the Boston Society of Civil Engineers held an excursion this afternoon to the garbage reduction plant at Spectacle Island. The party left the Public Landing, City Point, South Boston, at 2.30 P.M., in a tug furnished by the Boston Sanitary and Development Company. At the island the party was met by the superintendent who showed the members about the plant and explained the operation in detail.

At 5 P.M. the party returned to Boston.

On motion of Mr. Coburn, it was voted to extend a vote of thanks to the Boston Sanitary and Development Company for their courtesy in arranging this excursion.

Members present, sixteen.

JOHN P. WENTWORTH, *Clerk.*

APPLICATIONS FOR MEMBERSHIP.

[October 15, 1919.]

THE By-Laws provide that the Board of Government shall consider applications for membership with reference to the eligibility of each candidate for admission and shall determine the proper grade of membership to which he is entitled.

The Board must depend largely upon the members of the Society for the information which will enable it to arrive at a just conclusion. Every member is therefore urged to communicate promptly any facts in relation to the personal character or professional reputation and experience of the candidates which will assist the Board in its consideration. Communications relating to applicants are considered by the Board as strictly confidential.

The fact that applicants give the names of certain members as reference does not necessarily mean that such members endorse the candidate.

The Board of Government will not consider applications until the expiration of twenty (20) days from the date given.

CHISHOLM, HENRY, East Boston, Mass. (Age 25, b. East Boston, Mass.) Graduate of Mechanic Arts High School, 1912; studied railroad engineering at Y. M. C. A. and elements of structures in extension course of Wisconsin University; student at Lowell Inst. last year. During school vacation, 1911, draftsman with W. M. Bacon, architect; from June, 1912, to November, 1915, construction draftsman with Forbes Lithograph Mfg. Co., Chelsea; from November, 1915, to March, 1918, assistant to construction superintendent with United Shoe Machinery Co., Beverly; from March, 1918, to date, draftsman and engineer with Swift & Co. Refers to B. A. Bowman, H. L. Carter, R. H. A. Carter, Channing Howard, Robert Rand and S. E. Stott.

JONES, FREDERICK ELMER, Somerville, Mass. (Age 50, b. Cambridge, Mass.) Grammar School education, supplemented with courses at Normal Art School, Prospect Union, Y. M. C. A., etc. From April, 1887, to date, with engineering department, city of Somerville, with exception of about three months as rodman and draftsman with B. & A. R. R.; is now assistant engineer. Refers to E. W. Bailey, F. R. Charnock, C. H. Gannett, C. A. Pearson, T. P. Perkins and J. P. Snow.

LIST OF MEMBERS.

ADDITIONS.

ROWE, RANSOM J.....45 Milk St., Boston, Mass.
VARNEY, EDWARD A.....Wentworth Inst., Boston, Mass.

CHANGES OF ADDRESS.

BOWERS, GEORGE W.....Bank of Piræus, Athens, Greece
BRACKETT, LEROY G.....20 Monument St., West Medford, Mass.
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HORTON, FREEMAN H.....Missouri Highway Dept., Jefferson City, Mo.
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SMITH, CHESTER W.....249 High St., Newburyport, Mass.
WARING, CHARLES T.....420 Ninth St., Philipsburg, Pa.

EMPLOYMENT BUREAU.

THE Board of Government maintains an employment bureau for the Society, to be a medium for securing positions for its members and applicants for membership, and also for furnishing employees to members and others desiring men capable of filling responsible positions.

At the Society rooms two lists are kept on file, one of *positions available* and the other of *men available*, giving in each case detailed information in relation thereto.

MEN AVAILABLE.

488. Age 28. Received technical education at Sheffield Scientific School, Yale University. Experience covers general construction, surveying and lumbering. Desires outside position. Salary desired, \$1 500 per year.

Address all inquiries in regard to the following to W. V. Brown, Manager, Engineering Societies Employment Bureau, 29 West Thirty-ninth St., New York, N. Y.

ENGINEER of seventeen years' experience in hydraulic work desires executive position. Experience includes four years' studies and investigations, five years design, five years construction, three years maintenance and operation. Last position with U. S. Army, operating water supply and sewage disposal systems of army cantonment. A-4870.

NOTES FROM ENGINEERING COUNCIL.

ACCORDING to the best information obtainable by the License Committee of Engineering Council, laws providing for licensing of engineers are on the statute books of the following eleven states:

Wyoming, 1907.	Idaho, 1915.
Louisiana, 1908 (amended, 1914).	Florida, 1917.
California, 1909.	Oregon, 1919.
South Dakota, 1913.	Colorado, 1919.
Illinois, 1915.	Michigan, 1919.
Iowa, 1919.	

The License Committee is working on a draft of a typical bill which, it is intended, can be used if necessity should arise in states proposing new legislation on this subject, or in those proposing revisions, so that laws enacted for licensing engineers may be uniform, or nearly so, throughout the country.

Engineering Council, however, has as yet taken no stand on the desirability of licensing or registering of engineers. It desires to learn the opinions of engineers in various branches of the profession in all parts of our country; also to secure soon all information that would be helpful to the committee.

LIBRARY NOTES.

RECENT ADDITIONS TO THE LIBRARY.

U. S. Government Reports.

Bibliography of Petroleum and Allied Substances in 1916.
E. H. Burroughs.

Census of Electrical Industries, 1917: Telegraphs and Municipal Electric Fire-Alarm and Police-Patrol Signaling Systems.

Cotton Production in United States: Crop of 1918.

Determination of Combustible Matter in Silicate and Carbonate Rocks. A. C. Fieldner and others.

Diesel Engine: Its Fuels and Its Uses. Herbert Hass.

Farnham Anticline, Carbon County, Utah. Frank R. Clark.

Geology of Lost Creek Coal Field, Morgan County, Utah. Frank R. Clark.

How to Give Illustrated Lectures on Accident Prevention to Workmen.

Kantishna Region, Alaska. Stephen R. Capps.

Lead in 1916. C. E. Siebenthal.

Mineral Production of United States in 1916. H. D. McCaskey and Martha B. Clark.

Oil Fields of Allen County, Kentucky. Eugene Wesley Shaw and Kirtley F. Mather.

Our Mineral Supplies: Bibliography.

Potash in 1917. Hoyt S. Gale and W. B. Hicks.

Pulpwood Consumption and Wood Pulp Production in 1918.

Recent Developments in Absorption Process for Recovering Gasoline from Natural Gas. W. P. Dykema.

Vitiation of Garage Air by Automobile Exhaust Gases. G. A. Burrell and A. W. Gauger.

War Gas Investigations. Van. H. Manning.

Water-Power Investigations and Mining Developments in Southeastern Alaska. G. H. Canfield and others.

State Reports.

Massachusetts: Annual Report of Commission on Waterways and Public Lands for 1917.

Massachusetts: Annual Report of Metropolitan Water and Sewerage Board for 1918.

City and Town Reports.

Albany, N. Y. Annual Report of Bureau of Water for 1918.

Bangor, Me. Annual Report of Water Board for 1918-19.

Chicago, Ill. Explanatory Statement Regarding Two Laws Affecting Chicago City Government to be Submitted to Referendum Vote in Chicago November 4, 1919, together with Text of Laws.

Chicago, Ill. Proposed Tax Increases for City of Chicago, Board of Education, and Cook County.

Gloucester, Mass. Annual Report of Water Commissioners for 1918.

Reading, Pa. Annual Report of Bureau of Water for 1917.

Miscellaneous.

American Society for Testing Materials: A.S.T.M. Standards Adopted in 1919.

Canada, Department of Mines: Economic Use of Coal for Steam-Raising and House Heating, by John Blizard; Potash Recovery at Cement Plants, by Alfred W. G. Wilson.

National Board of Fire Underwriters: Motion Picture Film: Résumé of Results of Tests on Protective Requirements for Safe Storage.

Treaty of Versailles. Henry Cabot Lodge, Philander C. Knox, Gilbert M. Hitchcock and Woodrow Wilson.

LIBRARY COMMITTEE.

BOSTON SOCIETY OF CIVIL ENGINEERS
FOUNDED 1848

PAPERS AND DISCUSSIONS

This Society is not responsible for any statement made or opinion expressed in its publications

THE EQUIPMENT OF THE COMMONWEALTH DRY
DOCK AT BOSTON, MASS.

By FRANK W. HODGDON,* MEMBER BOSTON SOCIETY OF CIVIL ENGINEERS.

(Presented September 17, 1919.)

THE DRY DOCK. — The Commonwealth of Massachusetts, acting through the Commission on Waterways and Public Lands, has undertaken and nearly completed the construction of the largest dry dock in the world. The dock is admirably located at South Boston, and connected by a short approach channel to the main ship channel of the harbor. Its floor and dock walls rest directly upon solid ledge rock, — the typical slate of the Boston basin. The walls are constructed of mass concrete with a lining of granite on the inside and designed as a typical gravity section, providing for several altars 2 ft. in width.

The over-all length of the dock is 1 200 ft., measured from the coping at the inner end to the coping of the wing walls at the entrance; and the width is 149 ft., measured between copings of the side walls. The entrance section has a width of 133 ft. at the coping, with sides sloped on one to eight batter, affording a width of 120 ft. at the elevation of the top of the sill. The top of the dock wall is level 16 ft. above mean low water, and the

* Engineer, Commission on Waterways and Public Lands, State House, Boston, Mass. Mr. Everett N. Hutchins, Assistant Engineer to the Commission, assisted in the preparation of the paper.

sill at entrance is 35 ft. below mean low water. Mean high water increases this depth over sill to 45 ft.

The maximum length of ship which can be placed in this dock is 140 ft. In order to dock smaller ships economically, an intermediate sill was constructed as part of the dock structure, the dimensions of which are similar to the entrance section, and this sill is placed so that the length of the inner section of the dock is 668 ft. measured from the inner end to the intermediate sill, and the remainder or outer section is 520 ft. long, providing for two ships of 635 ft. and 490 ft. in length, respectively.

The conduits for filling and draining the dock consist of the following: One conduit 14 ft. wide and 15 ft. high, of arch section, extends from the outer end of the dock to a point in front of the pump house, a distance of approximately 430 ft., and is designated as the discharge conduit, receiving water from the main pumps. In the reverse operation this acts as a filling conduit by emptying through two sluice gates, each 6 ft. by 8 ft., placed in the side of the conduit directly opposite the discharge from the main pumps. These gates discharge into filling chambers, which act also as diverting chambers, and connect with four conduits leading out to the under side of the dock floor. One filling sluice gate fills into the two conduits which lead to the outer section of the dock and the other to the two conduits extending to the inner section beyond the intermediate sill.

These same four conduits become drainage conduits during the process of pumping out the dock, and they extend to a common suction chamber. Each conduit, however, is provided with a separate sluice gate 6 ft. by 8 ft., making it possible to shut off any one from the suction chamber. These six gates (four drainage and two filling) are operated by means of oil-operated hydraulic cylinders 19½ ins. in diameter, located in a special chamber outside of but connected by a passageway to the pump well. The pressure used to operate these gates is 300 lbs. per square inch.

THE PUMPING PLANT. — The pumping plant consists of three main pumping units, two small drainage pumping units, one sump pump and two oil-pressure pumps, all of which with

the exception of the oil-pressure pumps are of the vertical shaft type, each consisting of a volute centrifugal pump, direct connected to an electric motor. The main dry dock pumps (Fig. 1) have a 54-in. suction and discharge, and each is operated by a 1 250 horse-power constant-speed electric motor. The suction of each pump is connected directly, without a gate valve, to a

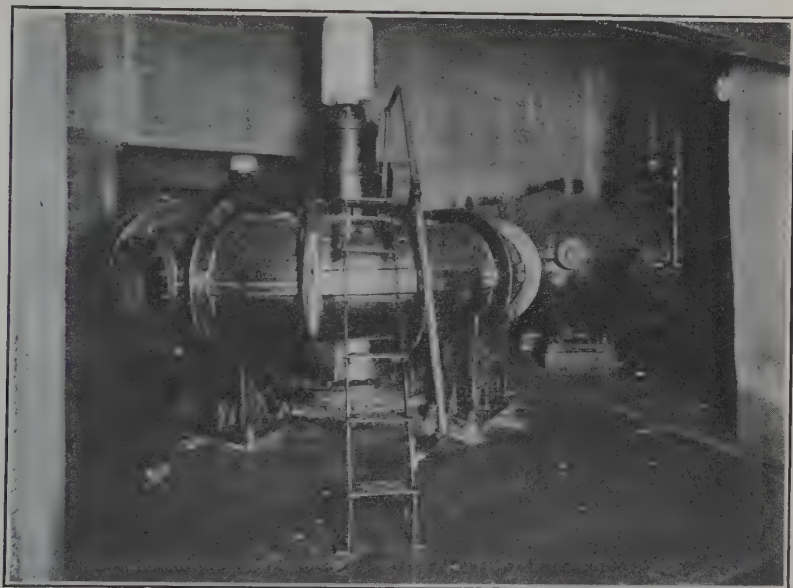


FIG. 1. MAIN DRY DOCK PUMP.

separate concrete conduit extending to the common suction chamber. The discharge from the pump connects to a check valve of special design of the butterfly type, beyond which is located a 54-in. gate valve, operated by an hydraulic cylinder, and an increase from 54 ins. to 60 ins. diameter, the size of the large cast-iron pipe which delivers the water to the main discharge tunnel. The operation of the check valve is cushioned by means of an oil dash-pot, connected by piston rod and crank to the shaft of the flapper. The pump impeller is of cast iron and is 71 ins. in diameter. The pump is placed in the pump well so that its center line is at an elevation of 9.5 ft. above the

floor of the dry dock. The motor of the pump is located on the main floor of the pump house (Fig. 2), which is 55.5 ft. above the dock floor, or 1 ft. higher than the coping of the dock and 46 ft. above the pump. The motor is the constant-speed induction type, having a speed of 240 r.p.m. The total weight and thrust of the pump impeller, shaft and rotor of motor, are



FIG. 2. MOTORS FOR DRIVING MAIN DRY DOCK PUMPS.

sustained by a spring-supported thrust bearing, the rubbing surfaces of which are constantly in a bath of oil.

The guaranteed capacity of each main pump is 100 000 gals. per minute, and the combined average over-all efficiency of the pump and motor is 56.5 per cent. Official tests indicate a slight excess in both of these figures. The three pumps operating together are capable of completely unwatering the dock in two and a half to three hours.

The two small drainage pump units are of the same type as the main pumps and have 15-in. suction and discharge openings. Their main function is to drain the dock floor and conduits under-

neath, which lead into the common suction chamber. From the bottom of this chamber a 20-in. pipe, controlled by a hand-operated gate valve, extends to 15-in. branch pipes with a hand-operated gate valve on each pump suction. The discharge of each pump is connected through a 15-in. gate valve, operated by hydraulic oil pressure cylinders, to the common 20-in. discharge



FIG. 3. MOTORS FOR DRIVING DRAINAGE PUMPS.

pipe, which contains a four-port check valve, and extends outside of the pump well in the masonry of the dock wall to the outer end of the dock and is wholly independent of the main discharge conduit. The 20-in. suction pipe mentioned above connects by means of a Y-branch and hand-operated gate valve to the bottom of the main discharge conduit, so that this may also be pumped out, after placing stop planks in grooves provided at the outboard end. There is also provided a 20-in. tee branch provided with a gate valve and suction pipe for pumping out the pump well itself, in case of emergency. These pumps are located 4.5 ft. below the dock floor, and their motors (Fig. 3)

are on the main floor of the pump house, 60 ft. above. Each of these motors is rated at 150 h.p., having a speed of 600 r.p.m., operating on 3-phase, 60-cycle, 440-volt current. The type of thrust bearing is the same as for the main pump motors.

The guaranteed capacity of each drainage pump unit is 6 400 gals. per minute, and the combined average over-all efficiency of the pump and motor is 52.0 per cent. Official tests indicate an excess of both of these figures.

In addition to this equipment for operating the dock proper, a small 3-in. centrifugal pump is installed in the sump at the bottom of the pump well, 72 ft. below the pump-house floor, for removing the seepage into the pump well. The discharge from this pump connects into the discharge pipe of the 15-in. pumps. This pump is controlled by an automatic switch, which is operated by a float in the sump chamber.

The electrical equipment is controlled by a switchboard located upon a balcony above the main pump-house floor. The operation of hydraulic cylinders on sluice gates and valves of main and drainage pumps is controlled at another board adjacent to the switchboard, thus affording centralized control for all apparatus. The power for operating the pumping plant is derived from 3-phase, 60-cycle, 13 800-volt service supplied by the Edison Electric Illuminating Company. From this 13 800-volt bus are taken two circuits through separate high-tension oil switches, one of which passes to a bank of three single-phase transformers, each of 1 250 k.v.a. capacity, stepping down the high-tension supply of 13 800 volts to 2 200 volts required by the main pump motors. The other circuit passes to another bank of three single-phase transformers each of 150 k.v.a. capacity, stepping down the 13 800-volt supply to 440 volts required by the other motors of the pumping equipment, the caisson pumps and other uses at the dock.

Miscellaneous equipment consists of a storage-battery charging set for operating high-tension switches and relays; two triple-action plunger pumps with an accumulator to maintain an oil-pressure supply system for operating sluice gates and gate valves; a 220 k.w. rotary converter for supplying the five electric capstans with direct current at 250 volts. There is

also a 20-ton hand-operated traveling bridge crane in the pump house, for handling pumps and motors.

In order that the operator may be constantly informed during any operation of the dock as to the tide elevation and water level within the dock, there have been placed at a convenient location on the operating balcony three recording water-

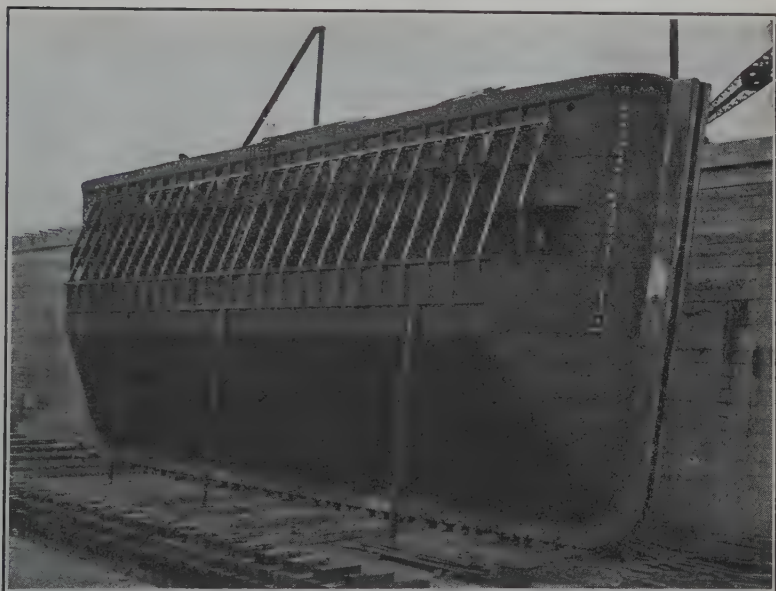


FIG. 4. CAISSON FOR CLOSING ENTRANCE TO DOCK.

level gages, one of which indicates tide level and the other two dock levels, one for inner and the other for outer dock sections. These gages are manufactured by the Sanborn Company and give very satisfactory indication of the water levels.

THE CAISSON. — The caisson (Fig. 4) for closing the entrance to the dock is of the hydrometer type, and when in position rests against a granite sill extending along the bottom and sides of the entrance section of the dock. The caisson is practically a ship, 138 ft. 6 ins. long, 53 ft. high, a maximum width of 27 ft. and minimum draft of 28.5 ft. In order to dock a vessel, the dock is filled with water to the same level as the

tide outside. Sufficient water ballast within the caisson is then pumped out by means of its own pumps until flotation at suitable draft is obtained and the caisson moved from the dock entrance by lines from the caisson to electric capstans located beyond the dock wall. After the ship has been placed in the dock, the caisson is then drawn into position, filled with water ballast until it rests on the bottom of the sill, and the dock then pumped out.

Structurally, the caisson consists of a series of steel girders with an outside plating or shell of steel, so that it floats as a ship, the lines of which are straight, however, instead of curved. The bottom of the caisson is filled with concrete ballast, above which is a space for the variable quantity of water ballast required for operating the caisson under varying conditions of draft. Water ballast is admitted to the caisson through two 10-in. pipes on each side of the caisson, these pipes extending from the outside plating and discharging free to the interior of the caisson, but each controlled by two gate valves, one of which is a quick-closing gate. The water ballast is removed by means of two 20-in. volute centrifugal pumps of vertical shaft type. These pumps discharge at opposite sides of the caisson. Each has a five-port foot valve on suction, a motor gate valve at the pump discharge, and a flap valve at the end of the discharge pipe, just outside the caisson plating.

On the main or operating deck (Fig. 5) are located the 60 h.p. motors for each pump, the motor-operated stands and hand-operated stands for all gate valves, the switchboard, delicate inclinometers for indicating the trim of the caisson, and a float gage which indicates the depth of water ballast within the hold. This main deck is made watertight but provided with two small inspection hatchways and one large machinery hatchway which provides an opening from the upper deck to the bottom of the caisson.

The motors on the caisson are operated on 440-volt current from the pump house, a flexible armored cable 200 ft. long being provided to connect between the caisson and a specially designed outlet box located on the dock wall. Similar provision is also made for supplying electric lights to the caisson.

CAPSTANS. — For pulling the vessels into and out of the dock, five large electrically operated capstans are installed, each capable of exerting a pull of 30 000 lbs. at 30 ft. per minute and 10 000 lbs. at 90 ft. per minute. One of these capstans is located at the inner end of the dock for hauling vessels in, and the other four are located on the two sides of the dock, one pair near the



FIG. 5. CAISSON INTERIOR, MAIN DECK SWITCHBOARD, GATE STANDS AND MOTORS.

outer end and the other pair about opposite the intermediate sill. These are operated by 250-volt direct current, which is taken from the pump house installation, the alternating current there being converted by a rotary converter, and carried in a loop circuit completely around the dock. At manholes in the dock wall this circuit is provided with special junction boxes, so that connections may be made for direct current service to the capacity of the converter.

For securing the vessels, in addition to the large capstans, six hand-capstans are installed, three on each side of the dock,

and thirty-two cast-iron bollards were spaced between the capstans, so that there is a mooring post substantially at every 60 ft. along the dock.

ENGINEERS. — This work was commenced and continued under the direction and supervision of the writer. Mr. John N. Ferguson, assistant engineer, was resident engineer in charge of construction.

CONTRACTORS. — The contract for the construction of the dry dock itself and the pump well was awarded to the Holbrook, Cabot and Rollins Corporation. The pump house was built by the Weiss Construction Company, and the interior stairways and guide-gearing supports for pump shafts were placed by the Donnelly Iron Works, Inc. The pumping plant was furnished by the Worthington Pump and Machinery Corporation, the electrical apparatus furnished through that corporation by the General Electric Company. The gate valves of the plant were furnished to the pump contractor by the Chapman Valve Company. The dry dock sluice gates and caisson valves were manufactured by the Coffin Valve Company. The caisson was built by the Bethlehem Steel Bridge Corporation. The pumps in the caisson were furnished by the Worthington Pump and Machinery Corporation as sub-contractors, and the electrical apparatus sublet to the General Electric Company. The electric capstans were furnished by the Wellman-Seaver-Morgan Company, and the electrical work by the General Electric Company. The hand-power capstans were furnished by the Dake Engine Company. Power circuits for capstans and caisson were installed by Irving L. Matson. The traveling bridge crane was furnished by the Whiting Foundry and Equipment Company.

GENERAL UTILITIES. — The masonry of the dock wall and pump house has been liberally provided with ducts for electric cables, openings for water and air pipes, with the expectation of providing additional electric equipment and compressed air for working on vessels, but owing to the contract for transferring the dock to the United States Government these additional facilities will be installed by the Navy Department.

MEMOIRS OF DECEASED MEMBERS.

JOHN ALLEN GOULD.*

JOHN ALLEN GOULD was the son of John Allen Gould and Nancy P. (Hartshorn) Gould, both of Walpole, Mass. He was born in Newton Upper Falls on December 14, 1852, and died in the same town on May 18, 1919.

In his death this Society has lost one of its old and faithful members; modest, cheerful and helpful in every good cause, he never failed to respond to the calls of the profession. He was active and accomplished in his chosen specialty, and his influence for the right will not soon be forgotten.

In September, 1873, Mr. Gould entered the service of the Boston Water Department, and with that department he remained for twenty years. His first work for the city was in connection with the distribution system, and in all matters pertaining to that branch of water supply he became expert. When the Brookline Gas Light Company desired to secure the services of some one capable of directing their far-reaching plans in the Metropolitan District they engaged Mr. Gould to direct them in their work.

In 1896 his activities found a still wider field with the Boston Gas Light Company, and with that company he remained until his death.

As the years passed, Mr. Gould's usefulness broadened, and his growing reputation for good judgment and engineering skill brought greater rewards. He was frequently called in a consulting capacity in connection with enterprises outside of his regular employment, and these consultations extended at times beyond the borders of New England.

Mr. Gould was a member of the New England Water Works Association, American Gas Association and the New England

* Memoir prepared by Desmond FitzGerald and William A. Wood.

Association of Gas Engineers. He was also a director of the Boston Consolidated Gas Company and was past president of the Guild of Gas Managers of New England; he was also a member of the Engineers' Club of Boston, the Newton Club of Newton, and was actively interested in several coöperative banks.

GILBERT HODGES.*

GILBERT HODGES, son of Joseph and Rosabella (Stockbridge) Hodges, was born December 8, 1850, at East Brookfield, Mass., and died at Franklin, N. H., February 13, 1919.

He attended the high school in Cambridge, Mass., and at the age of sixteen went to sea, where he spent four years, being shipwrecked in midwinter and rescued on his twentieth birthday.

In 1871 he entered the office of his brother, Arthur Hodges, and studied civil engineering until 1874. He then went into the wholesale paper and stationery business, holding a position with a large firm in Springfield, Mass., from 1874 to 1876, and with another similar firm in Omaha, Neb., from 1876 to 1881.

His true vocation was evidently engineering, and in 1881 he gave up trade and entered the service of the Union Pacific Railroad, being employed in making surveys and locations in Colorado, Wyoming and Kansas.

From 1882 to 1887 he was connected with the Boston & Lowell Railroad in the engineering, bridge and building departments as draftsman, assistant engineer and assistant master of bridges and buildings.

Having served a thorough apprenticeship in the different branches of his profession, he opened an office in Boston, Mass., in 1887, for general engineering, making a specialty of railway engineering, and in this he built up a large practice. Among other works he had charge of the construction of the Arch Bridge, to replace the old Bussey Bridge on the Dedham branch of the Boston & Providence Railroad. A good part of his practice was devoted to electric railways in New England and the Middle States. From 1893 to 1900 he had as a partner Mr. Ephraim Harrington.

* Memoir prepared by Ephraim Harrington and A. W. Hodges.

Between 1900 and 1909, after severing his partnership with Mr. Harrington, he continued in practice, making a specialty of valuations and consulting engineering in connection with railway properties.

In 1909 Mr. Hodges gave up his office in Boston and moved to Franklin, N. H., where he was residing at the time of his death. During his residence in Franklin he was engaged in municipal and private engineering in that city and surrounding towns, having charge of extensive improvements that were made in the city of Franklin.

For a number of years previous to his death Mr. Hodges was consulting engineer for the Boston & Lowell Railroad in connection with matters pertaining to the lease of that road to the Boston & Maine Railroad.

Mr. Hodges was at one time a member of the Common Council of Medford, Mass., where he resided for several years, and also served a term as alderman in Franklin, N. H. He was a thirty-second degree Mason and a member of several societies, including the American Society of Civil Engineers and the Boston Society of Civil Engineers.

He was married in 1877 to Abbie Webster Hurd, who died in 1907, and was married again in 1911 to Gladys Colby who survives him. A son and daughter by his first wife and two sons by his second wife also survive him.

Mr. Hodges was conscientious and painstaking in working up and carrying out the details of any work that he had in hand. He was a loyal friend and an agreeable companion with both his business and social acquaintances, being ever ready to lend a helping hand or a word of encouragement.

LEWIS FREDERICK RICE.*

LEWIS FREDERICK RICE, past president of the Boston Society of Civil Engineers, was born in the American House in Boston on May 17, 1839, and was the son of Lewis Rice, for many years the proprietor of this hotel and who died in 1877.

* Memoir prepared by George S. Rice.

He was a descendant of the Pilgrim Edmund Rice who came from England in 1638 and settled in Sudbury, Mass., in 1639, and was the leading man on a plantation lying near unto Concord and shared by him and others in the early days of the foundation of this country. He was a selectman in the district in which he lived, and his services were often called upon in many capacities by the General Court in administering the affairs of the Colony.

The mother of Lewis Frederick Rice, Susan Augusta (Brigham) Rice, was a direct descendant of Thomas Brigham who emigrated to the United States from England in 1635 and settled in a part of Watertown, now a part of Cambridge, Mass.

True to the instincts of their English ancestors, the Rices and Brighams migrated to the different parts of this country, principally to New England; the Brighams going to Marlboro and Northboro.

In studying the published genealogies of the Rice family it is noticeable as a curious fact that while Susan Augusta Rice's son Frederick was descended from Edmund Rice by his first wife, Edmund Rice took as a second wife "Mercy," the widow of Thomas Brigham, and the son of Thomas Brigham married the granddaughter of Edmund Rice, the Pilgrim, and the two families were again reunited in the marriage of Lewis Rice and Susan Augusta Brigham. Both the Rices and the Brighams have been very patriotic since their arrival from England as emigrants, their descendants having had thrilling experiences in the Indian wars and serving with distinction in the Revolutionary War and the War of 1812.

Lewis Frederick Rice was educated in the Boston public schools, continuing his studies at a military school near West Point, and graduating at the Troy Polytechnic Institute, Troy, N. Y., as a civil engineer in 1858.

He immediately entered his professional career on the engineering staff of the St. Louis, Mo., Water Works, and later was division engineer on the Troy & Greenfield Railroad in Massachusetts.

At the outbreak of the Civil War he enlisted as first lieutenant in the Department of the Gulf, 19th Army Corps. He was

engaged, beside many minor engagements, in those of Forts Jackson and St. Phillips, Port Hudson, Fort Blakely, Mobile Bay, Mobile, Pattersonville, Yellow Bayou and operations around New Orleans.

He was made first lieutenant, 31st Massachusetts Infantry, February 20, 1862; promoted to captain October 10, 1863; commissioned major June 7, 1865; brevet major, U.S.A., March 13, 1865, "for gallant and meritorious services at Sabine Cross Roads, Cane River Crossing, Hudnots' Plantation, Moore's Plantation, Yellow Bayou, campaigns against Mobile," and was at the taking of New Orleans.

At the end of his three years' service in 1864 his regiment returned to Massachusetts, but a portion re-enlisted and Captain Rice returned to Louisiana with the battalion and was subsequently detailed for the exhaustive Red River expedition in which his conduct gained special mention and commendation.

At the end of his military service in 1865, he again engaged in the general practice of his profession in Boston.

He accepted a position as assistant engineer with the Reading & Columbia Railroad, which he soon relinquished to take a like position on the St. Louis Water Works, St. Louis, Mo.

He continued in St. Louis until the year 1871, when he returned to Boston to resume his practice of architecture and civil engineering.

His railroad work was continued later in the construction of the Perkimen Railroad of Pennsylvania and the Wills Valley Railroad in Alabama.

He was engaged on studies of an engineering nature, for the following New England cities and towns: Concord, N. H.; Framingham, Haverhill, Lawrence, Lowell, Plymouth, Watertown, Westboro in Massachusetts; and these included investigations for systems of sewerage for Framingham, Lawrence and Plymouth in Massachusetts. All of these investigations were made in his characteristic way, with the fidelity and accuracy inherent to him and due to his careful training and well-ripened experience.

In 1890 he entered the service of the American Bell Telephone Company and continued in their employ until the year

1908. As architect and civil engineer he superintended the construction of the company's buildings with a fidelity natural to him. He was faithful in his country's service, and was particularly interested in mingling in the gatherings of his former comrades and associates.

He was a member of the American Society of Civil Engineers; of the Massachusetts Society of Colonial Wars; of the Military Order of the Loyal Legion, and of the Order of St. John of Masons in Boston.

The activities of his military career in the Civil War led to his selection as historian of his regiment. He had been collecting a large amount of material for this work and the detailed research necessarily involved in the task was the source of great pleasure to him. This work, however, he was obliged to leave in an unfinished state, owing to his failing health, which occasioned his retirement from business. He died in Brookline, Mass., on April 12, 1909.

Besides his son Frederick Ellis Rice he was survived by his widow Caroline Elizabeth (Ellis) Rice, to whom he was married October 25, 1867.

He had two sons, Lewis and Frederick Ellis, but his eldest son Lewis died on April 2, 1899.

Throughout his life, accuracy and proper methods in life and thought were his predominating characteristics, and at all times he was interested in questions of the day, was outspoken in his views and independent in action.

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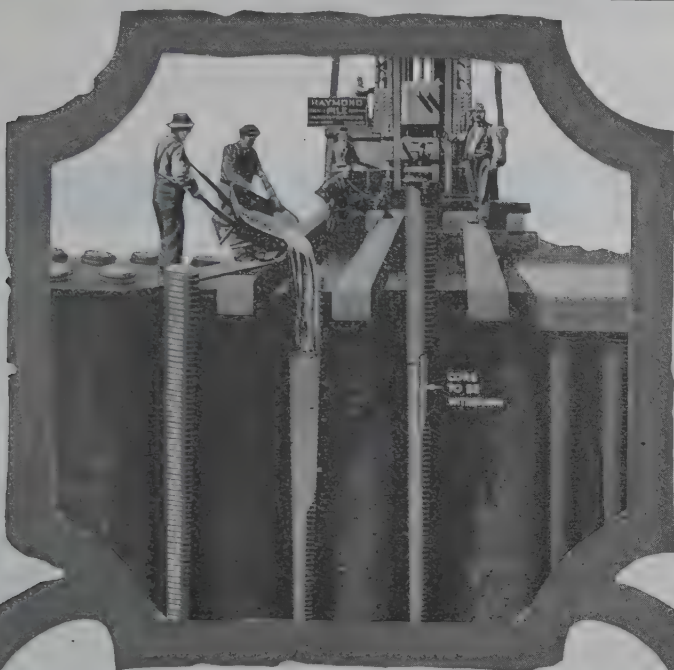
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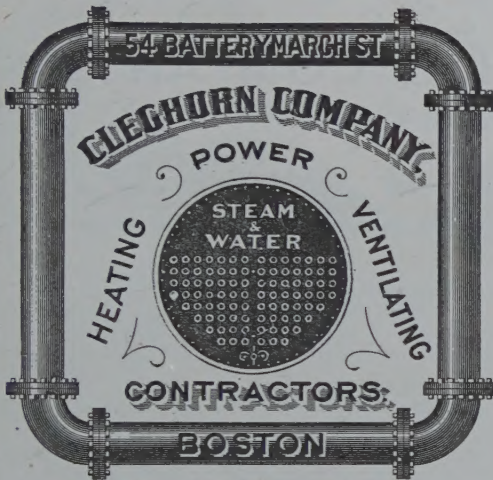
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